

old view as stated by Dr. Lindley, and that the presence of the fibre-cells bears me out in it. Added to this, we have usually a six or seven-lobed involucre, which would represent the bracts due to each flower, taking the central one as a perfect pattern. I have examined the flowers of another species of Reseda, the *R. fruticaulis*; I find the glandular bodies supporting the petals are not nearly so large as in the common Mignonette, but each fringe has a small number of fibro-cells developed in it. That these fleshy glandular parts have been noticed and compared with the central one of the flower is well known, but no explanation has ever been offered save by Dr. L. and now by myself. He again says, when speaking of the part termed *disk*, "It is an opinion, which daily gains ground, that the disk is really only a rudimentary state of the stamens, and it is thought that the proofs of the correctness of this hypothesis are to be found in the frequent separation of the cup-like disk into bodies alternating with true stamens, as in *Gesneria*, and in *Parnassia*, in the resemblance to bundles of polyadelphous stamens."

I trust, therefore, the view I have revived and attempted to illustrate, will not be deemed untenable; as also in a paper I lately brought forward, I instanced the Plantain of Europe developing its ovules into leaves, and in some specimens into true flowers, each case serving to show us that any part of a flower may be developed into a different kind of organ than that predicated by its position in the particular flower.

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ART. VI.—*On the Coccus affecting the Orange.* By THOMAS S. RALPH, Esq., M.R.C.S., and Assoc. Linn. Soc. Lond.

[Read 19th August, 1861.]

The chief object I had in view in bringing before the Society some observations on the insect which attacks the fruit of the Orange, was to direct the attention of microscopists and others to the study of one of those forms of insect life, which present many favourable opportunities for a series of observations bearing on the structure of the *Coccus* family generally; and perhaps these observations might be attended with advantage to others, by directing their attention against the probable results which may follow from the attacks of this insect upon the Orange, as an article

of produce. That orange crops have been injured by this insect is no new fact to bring before you.

In 1843 the ravages by the *Coccus*, of the orange trees, had been so extensive as to cause the loss of the entire produce in one of the Azores, and the evil rapidly extended itself to the other islands, so that the whole injury done appears to have been the work of three years only.

The insect belongs to the same family as that which yields the cochineal dye (*Lac*); and is commonly recognised as the *scale* insect upon green-house plants. Last summer I noticed a few of these scales on a piece of shaddock-rind, which I kept for examination; but this winter has supplied me with a more abundant crop than I remember to have seen; and some lemons, also, present a few on their surface; but whether the disease is on the increase or not I am unable to state.

The fruit is found sometimes fully covered over with circular scales, of a dark reddish yellow hue; each scale presenting a slight, nearly central elevation, with a light-coloured margin: it can be readily detached by the point of a needle, or the scales come off in numbers on peeling off the rind. They should be transferred to a glass slide, with that side uppermost which was in contact with the orange, and moistened with a drop of water, and covered with thin glass in the usual way, they may then be examined under the microscope.

Within the round scale may be seen a yellow or amber-coloured animal, which, at first sight, it is difficult to recognise as such, especially as the insect is likely to be met with in varying conditions: the usual form is that of a rounded one, with a deep notch on one side, while the border presents a thickened margin, and sometimes exhibits a number of leg-like appendages. The nearly transparent shell or case of the insect will be seen to be very delicately striated in most parts, an appearance which is apt to be lost whenever the fluid applied to it comes completely into contact with the surface. The portion which presents the notch appears to be the hinder or tail-end of the insect, and is likely to be taken for its head, which, I believe, is indicated by the presence of three *setæ*, which in some specimens can be seen to spring from that portion which occupies the centre of the disk, and is of a yellower colour. On either side of this part may be seen two points, which appear like openings for respiration, or what are technically called

*stigmata*, because from these radiate a number of exceedingly fine lines towards the circumference of the body (of the insect), arching and uniting much in the manner of the tracheæ or respiratory tubes of insects; but these tube-like lines I am unable to make out as being constructed on the same plan as those of higher insects, which consist of a spiral fibre closely rolled up inside them, in order to keep them from collapsing; but analogy would lead us to infer that they are so constructed. And here we have a difficult point for the microscopist to solve, requiring good management, and a very powerful instrument, in order to verify the fact. By manipulation of different kinds it will be found that there exists a central body, which is itself surrounded by a number of perhaps thirty or more vesicles, contained in a part extended nearly all round the body, except the notch. These vesicles appear to contain a multitude of minute oily dots, and are the ova or eggs of the insect, which may, by careful observation, carried on during the whole of the season, lead to a further acquaintance with facts of interest in physiology. In some, which have become more advanced, I have recognised the central mouth-like part even in this the egg condition. Each scale, when removed from the orange surface, leaves behind a small white pit or cavity, in which the insect fed upon the juices of the plant. This pit is lined with a white substance, which appears to have been excreted from the animal, and is not due to any abrasion of the cuticle of the orange. When we lift up the scale, to remove it, it will be often found that this depression contains in its centre two or three fine brown hairs, of extreme tenuity: these are the bristles or *setæ* to which I have alluded, and by which the insect is evidently anchored securely to the orange, and by which, I believe, it derives its nourishment. It also accounts for the frequent absence of these organs in the specimens when examined; and if this is really the mouth, may also explain the difference of opinion expressed relative to their number in some species; and, therefore, should be a point for observation by any who investigate the structure of the species of *Coccus*. The best specimens will, I think, be found in those oranges which are of a light yellow colour, and in which the scales are not overcrowded, as also in the more recently imported fruit.

There is another fact worth remarking, and one which I have noticed in the case of other *Cocci* infesting other plants, that these insects are always accompanied by mildew, or

fungus of some microscopic kind. Not only are they apt to attack the scales themselves, but the stems of the plants are generally covered with a black sooty covering, which consists of *Mycelia*. Thus there is a double cause operating to injure the plant by robbing it of its juices, or preventing those changes in the sap which may be necessary to the full development of the fruit.

I am not acquainted with the male insect, this being the female, and is not winged as the other is. It is probable, I think, that a similar insect attacks the Orange elsewhere. Some twenty years since, I remember seeing oranges grow in India; and was informed that, during the *setting* of the fruit, the natives were accustomed to light small fires under each tree at night, in order to drive away some insect which, at that season, usually attacked the fruit.

In the present case, supposing the attacks of this insect are likely to extend, I should be inclined to try some such plan; or else water each tree with a mixture of sulphur and water, and a small quantity of gum, in order to render it adherent to the leaves, &c., for a short space of time. I see by the late news that a paper on this very subject was read in March or February last; but no account or observations on the subject have, as far as I know, yet reached the colony. I can only suggest the following, as I have had no time for working the subject up, and would gladly leave it to others: That the young insect gradually develops into a small ova-bearing one; and that its remains then form a kind of tent or shelter; and that another insect either appropriates this scale, and adds to it another beneath it, and larger in extent; or, there is some explanation of a similar kind to be sought out relative to the structure of the external scales, which, in some instances, appear to have resulted from three layers of scales, each below the other, and increased in size, the uppermost being empty when laid open.

The exceeding transparency of the insect, its numbers, and the ready way in which it can be obtained, all recommend it as a highly interesting object for the student, be he young or old; and one which will well repay the time and attention bestowed on the study of its structure.